

SYSTEMATIC OF EXPERT SYSTEM BASE ON SOFTWARE AND CALCULATION METHOD

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Abstraksi

Sistem pakar adalah sistem yang berupaya mengadopsi pengetahuan manusia ke dalam teknologi, sehingga teknologi dapat memecahkan masalah seperti yang biasanya dilakukan oleh para ahli. Sistem pakar yang baik dirancang untuk memecahkan masalah tertentu dengan meniru pekerjaan para ahli. Dengan sistem pakar, orang awam dapat memecahkan masalah yang cukup rumit, karena pada kenyataannya masalah hanya dapat diselesaikan dengan bantuan para ahli. Untuk para ahli, sistem pakar juga akan membantu kegiatannya sebagai asisten yang sangat berpengalaman. Saat ini ada banyak penelitian yang mengangkat kasus tentang sistem pakar. Penelitian ini bertujuan untuk membuat sistem pakar yang sistematis berdasarkan kumpulan kasus sistem pakar dan mengklasifikasikannya berdasarkan alat yang digunakan, tipe implementasi dan metode yang sering digunakan..

Kata Kunci :

Systematic, Expert System, Technology, IT

Abstract

The expert system is a system that seeks to adopt human knowledge into technology, so that technology can solve problems as is usually done by experts. A good expert system is designed to solve a particular problem by imitating the work of the experts. With expert systems, the layman can solve quite complicated problems, because in fact the problem can only be solved with the help of experts. For experts, the expert system will also assist its activities as a highly experienced assistant. Currently there are many studies that raise cases about expert systems. This study aims to create systematic on expert systems based on a collection of expert system cases and classify them based on the tools used, implementation types and frequently used methods.

Keywords :

Systematic, Expert System, Technology, IT

I. Introduction

The Expert systems are systems that seek to adopt human knowledge into technology so that technology can solve problems as is usually done by experts [1]. A good expert system is designed to solve a particular problem by imitating the work of the experts. With expert systems, the layman can solve quite complicated problems, because in fact the problem can only be solved with the help of experts. For experts, the expert system will also assist its activities as a highly experienced assistant.

This study discusses the systematic of the Expert System, this research will focus on the tools and methodologies used in the expert system [2]. If a layman wants to use an expert system or experts want to build a good expert system, good tools and

methods should be applied. Before a layman uses and builds experts can choose the right tools and methods for this expert system, classifications must be made first to define tools and methods.

II. Literature Review

This literature review is used as a comparison between research that has been done and research that will be done. These studies include the following:

1. Ekawati Yulsilviana, Hafiz Ansari (2013), "EXPERT SYSTEM FOR DAMAGE VEHICLE MOTOR VEHICLE TWO TYPE YAMAHA MATIC ON REZA JAYA MOTOR SAMARINDA",

The results of the study are:

- A. Expert System of Vehicle Damage Diagnosis The Two Types of Matic Brand Yamaha Motorbike is a computer-based solution to the problems that occur at this time in the process of diagnosing damage to two-wheeled vehicles. Therefore the Expert System that has been made is expected to simplify and speed up the process of diagnosing damage to two-wheeled automatic vehicles.
 - B. Expert System of Vehicle Damage Diagnosis The Two Types of Matic Mio Soul Wheels on Reza Jaya Motorized Computerized Samarinda can provide faster, more precise and efficient results for its users, especially to the Mechanics who will carry out repairs of two-wheeled vehicles.
2. Herman Nurdiawan, Dini Destiani, Siti Fatimah(2016), “DEVELOPMENT OF VISUAL PROLOGY TOMATO PLANT DIAGNOSIS EXPERT SYSTEM DIAGNOSIS”.

The results of the study are:

- A. The expert system for tomato plant disease diagnosis based on Visual Prolog has been successfully developed.
- B. The test results using the black box method, that the expert system that has been developed is running well, and this expert system has accommodated expert knowledge.
- C. The expert system of tomato plant disease diagnosis can be used as an alternative for farmers, to conduct consultations in identifying tomato plant diseases based on symptoms experienced.

3. Fajrian nur Adnan, Khaafizha Nur Rakhmah, Adhitiya Nugraha (2016), “APPLICATION BASED ON EXPERT SYSTEM TO PREDICT EMPLOYMENT OPPORTUNITIES FOR PROSPECTIVE GRADUATE STUDENTS IN DIAN NUSWANTORO UNIVERSITY INFORMATION SYSTEM ”.

The results of the study are:

The conclusion that the application of job opportunities prediction based on expert systems can be very helpful especially students majoring in information systems in predicting suitable employment opportunities after they graduate later with the accuracy value obtained when testing the validation of the application using data testing that results at 80%.

4. Yoni Apridiansyah, Nuri David Veronika, Ria Oktariani (2017), “DESIGN AND IMPLEMENTATION OF EXPERT SYSTEM TO DETERMINE TYPE OF AUTISM IN CHILDREN AGED 4-6 YEARS WITH FORWARDING CHAINING METHOD ”.

The results of the study are:

- A. The research data generated new software about experts to diagnose the type of autism in children aged 4-6 years based on WEB that can interact like an expert. This system can be used as a consultation media.
- B. The resulting software can diagnose the type of autism in children aged 4-6 years based on the symptoms entered and can provide a solution.

5. Mercydian Pengkey, Vecky Poekoel, Oktavian Lantang (2016), “ANDROID-BASED HANDPHONE DAMAGE DETECTION EXPERT SYSTEM ”.

The results of the study are:

With the application of this expert system, it can help time efficiency in getting results from damages that occur on mobile phones as well as minimize costs for consulting a technician. However, it does not completely replace the role of experts (technicians) for more analysis results

III. Methodology

This research was conducted by doing some of the surveys on the national journals or national seminars on the topic of Expert System. The accumulated paper then analyzed and documented for classification.

Classification is the processing to find a model or function that describes the concept or character of data, for a particular purpose [2]. Classification is done on various references obtained. In this research, the classification is based on the tools of calculation methods used. Based on the results of this classification, an analysis will be made using the tools and methods on the system.

IV. Result And Discussion

A. Research Review

Research on the expert system did in 2014 with the issue of Diagnose Type of Stroke Disease [3], The purpose of this study is to make expert system software that is expected to help the community in diagnosing the type of stroke. The next development process is implemented using Visual Basic 6.0. The result of the research is an expert system application program capable of diagnosing as many as 6 Stroke Diseases. The output of the system is a diagnosis of disease with MB value, MD value and CF value obtained by calculation using Certainty Factor method, cause, and solution.

In the following year Mohammad Arifin, Slamim, Windi Eka and Yulia Retnani [4], expert system of pest and disease diagnosis in tobacco plants was built to help diagnose pests or diseases that attack plants tobacco, as well as providing various solutions for pests or diseases. The method used in this expert

system is the Certainty Factor method. The Certainty Factor method was chosen because the method is suitable for the process of determining pest and disease identification, and the result of the application of this method is the percentage.

Percentage of the system here is the level of accuracy of the determination of diseases or pests that infect tobacco plants. The determination of percentage is influenced by the value of MB obtained from the system and the value of MD obtained from the assessment of an expert [5]. Based on research conducted, the determination of pests or diseases that attack tobacco plants is influenced by the selection of symptoms. The percentage of expert system consultations is taken from the highest first and second results, as alternatives to other pests or diseases that attack tobacco plants.

In the same year Yunanri,W, Doddy Teguh Yuwono, Ika Safitri windarti [6], conducted research by applying Forward Chaining method and Certainty Factor which was used as calculation method. This expert system is built using web-based programming, allowing users to diagnose pests that attack the Orchid *Coelogyne Pandurata* plant (Black Orchid Borneo) from various literature and early observations become easier. The result of application of forward Chaining and Certainty Factor Method can give pest diagnosis on Orchid *Coelogyne Pandurata* based on the symptoms given Based on the calculation, the description of confidence level based on the interpretation table of the expert and the final percentage of 93,0736% is Very Might both of these methods applied to solve existing problems.

The expert system also applies In Plantation sector [7], the rubber plantation in Kuantan Singingi regency plays an important role for the economy, because it is a search of its people, the last few years have decreased productivity one of them caused by disease or disease that is root disease and stem. Less knowledge of the disease being suffered by the crops worsened the situation, then built the expert system of rubber plant diseases using the Demster-Shafer method at Android-based, so it can provide solutions in terms of determining the disease, the level of confidence, and solutions to overcome them. On testing the expert system in accordance with the expected both the resulting disease and the level of confidence compared with manual calculations Demster-Shafer method.

Subjects in this study is an expert system to diagnose gastrointestinal diseases. In this research using the method of uncertainty using Dempster Shafer method. This expert system development step begins with system requirements analysis, system design, implementation, integration, and testing system with black box test and alpha test. System design is implemented into the language using Visual

Basic 6.0 and Microsoft Access. The results of this study is a system of experts to diagnose gastrointestinal diseases as many as 19 types of diseases and use the method of Dempster Shafer to obtain a certainty in the form of the percentage of disease diagnosis. Based on the results of testing the program it can be concluded that the program is feasible to use and can help users is patients and medical personnel.[8].

Another research is the design of expert systems to diagnose early sepsis disease from the symptoms felt by the user[9]. The expert system built using Microsoft visual studio.net 2008 and database application used is MySQL expert system is expected as a means of consultation to avoid dangerous diseases resulting in death due to a delay of early handling. Expert systems produce the possibility of the disease based on the trust value of the symptoms felt by the user. The trust value is the result of the calculation by using the Dempster-Shafer method. The Dempster-Shafer method is a method of uncertainty to produce an accurate diagnosis. Due to the addition or subtraction of new facts in the form of information on symptoms and illness. This method provides a value of confidence to the experts in the knowledge it has. This study aims to implement the Dempster-Shafer method of diagnosing Sepsis disease. Based on the results of testing Dempster-Shafer method, it can be concluded that the accuracy of the resulting value of 84%.

Research on the diagnosis of giant prawns as conclusions using inference engine with the forward-chaining fact-finding method using If-Then method, and the theorem of Bayes certainty method. The application development phase begins with the analysis phase and the definition of requirements that result in knowledge engineering, data requirements, and system requirements. The second stage is the design of systems and software, which consists of building a knowledge base such as making a decision table, creating a rule base, making the inference engine and create a search graph. And the design process that consists of the design menu and interface design. The third stage is the implementation and unit testing. The next stage is integration and system testing using alpha test and black box test.

From the test conducted to produce Expert System to Identify Giant Prawn Disease with Bayes Theorem Method that can work like a giant prawns expert [10]. The resulting information is the name of the disease, the definition of the disease, the causes, the accompanying symptoms, the solution, and the probability of the disease. The test results show that the app is feasible and usable.

Research on the diagnosis of rabbit disease conducted using the Forward Chaining fact-finding method and the theorem of Bayes certainty method.

The application development phase begins with the analysis phase and the definition of requirements that result in knowledge engineering, data requirements, and system requirements. The second stage is the design of systems and software that generate the design process of the Context Diagram, Data Flow Diagrams, Entity Relationship Diagram, Mapping Table, Table design and menu design and interface. The third stage is the implementation and unit testing using XAMPP, Macromedia Dreamweaver 8 and Microsoft Office Access 2007. The next stage is the integration and testing system using Alpha Test and Blackbox Test. [11].

From the tests conducted to produce Web-Based Expert System to diagnose Rabbit Disease that can work like a veterinarian. The resulting information is the name of the disease, the definition, the cause, the accompanying symptoms, the description of the disease, the treatment solution, and the probability of the disease.

In this research, the writer makes this application web based on using Bayes method. The result or outcome of this application gives a probability of pest and disease in chili plants, and then the hypothesis is chosen with the greatest value.[12].

Research on the diagnosis of Corn crop disease is one cause of production of corn is not a maximum, downy mildew can cause harvest failures up to 90%, the presence of an expert would be helpful in terms of solving the diseases that attack plants of corn by means of identifying the symptoms that plagued and conclude what disease attack and provide information to settle the issue. Naive Bayes method is a method used to predict probabilities. While Bayes classification is the classification of statistics that can predict the probability of a class member. For a more simple Bayes classification known as naïve Bayesian Classifier can be assumed that the effect of an attribute value is a class given is free of other attributes. The required variable in this study are the symptoms on the leaves, stem and cob of corn plants. The results of this research testing showed all functional requirements are valid, the accuracy accuracy of the system are 96% and the results of usability testing stated it very well.[13].

Another research of expert systems is Handling pest and disease on rice plants regularly is rarely paid attention so that rice plant farmers often fail to harvest. Failure in harvesting makes farmers panic and confused about what to do because they are not accompanied by experts. Therefore, in this final project, the writer creates expert system with forward chaining method as the conclusion drawer and bayes method as the means to overcome trouble of uncertainty to diagnose pest and disease on rice plants so that solution or temporary handling in the form of pilot to anticipate failure in harvesting before

questioning the experts to have further action. This expert system employs web system so that it can be accessed by users. [14].

B. Tools Based Systematic

The Systematic that classifies Expert Systems based on the used tools is shown in Figure 1. Figure 2 is a sub-taxonomy of Figure 1, which classifies Expert Systems based on desktop application

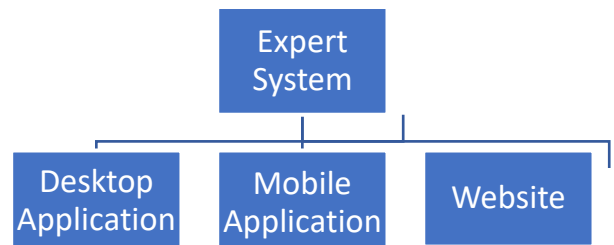


Fig. 1: Systematic of Expert System Based on System Implementation

- Desktop Application Sub-Systematic

The desktop application is an application that runs offline on a desktop PC. Even though computers are connected to a network, desktop applications cannot be accessed by others within the same network. This is because the desktop application is a stand-alone application that can only be used by the computer that installed the application. Desktop application decision support systems can be divided according to commonly used programming languages such as Java and Visual Basic.

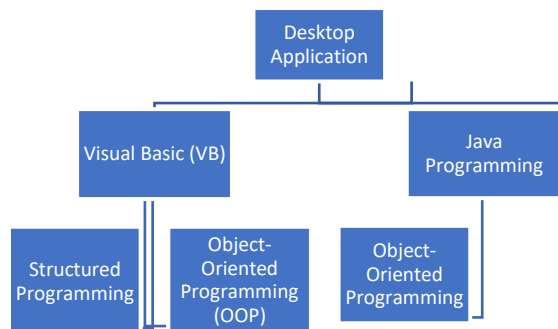


Fig. 2: Desktop Application Sub-Systematic

- Mobile Application Sub-Systematic

The mobile application is an application that able to run online or offline on mobile devices/smartphone. This application is made with the aim of making it easier for users to make decisions anywhere and anytime. However, this application should still have a platform for its use. The widely used platform is Android and iOS. In both Android and iOS, the programming languages that support the development of the application are just Java programming languages. Figure 3 shows the Systematic of Expert System based on mobile application.

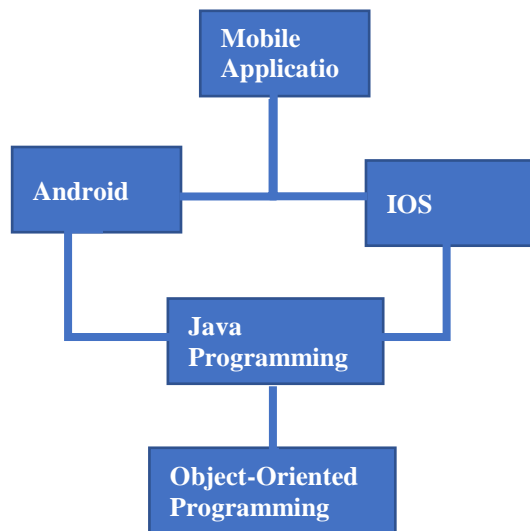


Fig. 3: Mobile Application Sub-Systematic

- Visual Basic (VB)

Visual Basic is a programming language that can be running on a computer. Visual Basic is a derivative of the BASIC programming language. In the implementation of decision support systems, VB is in demand because the language and script order is easy to understand. In addition, java programming also supports structured and object-oriented programming types. In some research, this can be seen from the use of the type of flow diagram.

- Java Programming

Java programming can be used in developing computer applications on many platforms, including mobile OS. The Java programming language adopts the syntax found in C and C++ [15], but in Java the object model syntax is made simpler, it makes Java Programming is easier for users of previous programming languages. However, the Java programming language only supports object-oriented programming type.

- Website

Web-based Expert system is one option that is widely used by developers of system builders because the website is easily accessed on the network using the browser, so it is easier than desktop-based application. Unlike the website, desktop-based applications require users to install on a computer first. Website can be accessed using various forms of devices as long as they are connected to the network and have a browser. [16]

C. Most Used Method Based Systematic

The Systematic based on most used methods is shown in Figure. 4.

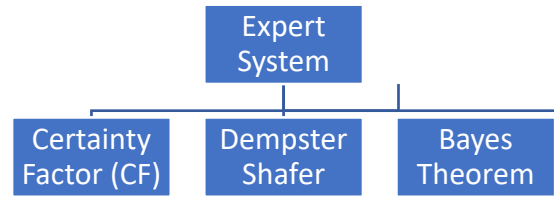


Fig. 4 : Method Based Systematic

Certainty Factor (CF) method is the best known and most used method for dealing with problems made by the value of certainty. The factor of certainty is the way of confounding beliefs and unbelief in a single number in the theory of qualitative data is represented as a degree of confidence (degree of belief). The Certainty Factor (CF) shows the size of certainty to a factor rule [2].

Dempster Shafer is a mathematical theory for evidence based on the function of belief (reason of trust) and logical reasoning (reasonable thinking), used to combine separate pieces of information (evidence) to calculate cases. [9]

To determine a decision statistically, Bayes's theorem can be used to calculate the statistical method, because Bayes's theorem is able to calculate the probability of the occurrence of an event based on the effect that can be obtained as a result of observation, for example : in the framework of problem solving in decision-making containing uncertainty [13]. Bayes method is also a method for generating parameter estimation by combining information from samples and other information that available previously

V. Conclusions

Based on the Systematic research that has been conducted, it can be concluded that the Expert System can be divided into two groups, these groups are tools and methods. In tool based Systematic, the Expert Systems can then be subdivided into 3 subgroups, these subgroups are Desktop, which is offline, and the platform is on a PC / laptop, and Mobile applications that can be running on Android or iOS platform on the smartphone / tablet as a device and a website that can be accessed via any device connected to the internet. In desktop applications can then be subdivided according to the form of programming, these forms are structured programming and object-oriented programming. Mobile-based Expert System can be divided according to the platform: Android and iOS.

There are also several reviews that have been listed showing that decision support system is very useful and needed in the decision-making process. Method-based Systematic has been made based on the information about a most commonly used method of a decision support system. This method-based

Systematic is divided into 3 most commonly used methods namely Certainty Factor, Dempster-Shafer, and Bayes Theorem.

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